



**Five-Year Review Report  
Federal Creosote Superfund Site  
Somerset County, New Jersey**



**Prepared by:**

**United States Environmental Protection Agency  
Region 2  
New York, New York**

**May 2012**

## Five-Year Review Summary Form

### SITE IDENTIFICATION

**Site Name:** Federal Creosote

**EPA ID:** NJ0001900281

**Region:** 2

**State:** NJ

**City/County:** Manville/Somerset

### SITE STATUS

**NPL Status:** Final

**Multiple OUs?**

Yes

**Has the site achieved construction completion?**

Yes

### REVIEW STATUS

**Lead agency:** EPA

**If "Other Federal Agency" was selected above, enter Agency name:**

**Author name (Federal or State Project Manager):** Rich Puvogel

**Author affiliation:** United States Environmental Protection Agency

**Review period:** June 7, 2007 – April, 2012

**Date of site inspection:** October 13, 2011

**Type of review:** Statutory

**Review number:** 2

**Triggering action date:** June 7, 2007

**Due date (five years after triggering action date):** June 7, 2012

## Five-Year Review Summary Form (continued)

### Issues/Recommendations

**OU(s) without Issues/Recommendations Identified in the Five-Year Review:**

OU 1, OU2

**Issues and Recommendations Identified in the Five-Year Review:**

OU(s): None	Issue Category: No Issue			
	Issue: NA			
	Recommendation: NA			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
NA	NA	NA	NA	NA

### Protectiveness Statement(s)

*Operable Unit:*  
Operable Unit 1

*Protectiveness Determination:*  
Protective

*Addendum Due Date (if applicable):*

*Protectiveness Statement:*

Click here to enter text. The implemented actions at OU1 are protective of human health and the environment. All exposure pathways that could result in unacceptable risks are being controlled.

*Operable Unit:*  
Operable Unit 2

*Protectiveness Determination:*  
Protective

*Addendum Due Date (if applicable):*

*Protectiveness Statement:*

The implemented actions at OU2 are protective of human health and the environment. All exposure pathways that could result in unacceptable risks are being controlled.

### Five-Year Review Summary Form (continued)

*Operable Unit:*  
Operable Unit 3

*Protectiveness Determination:*  
Protective

*Addendum Due Date*  
*(if applicable):*

*Protectiveness Statement:*

The implemented actions at OU3 currently protect human health and the environment because a CEA has been implemented to prevent ingestion of contaminated groundwater and soils have been remediated preventing direct exposure to contaminated material. All exposure pathways that could result in unacceptable risks are being controlled.

### Site-wide Protectiveness Statement (if applicable)

*For sites that have achieved construction completion, enter a site-wide protectiveness determination and statement.*

*Protectiveness Determination:*  
Protective

*Addendum Due Date (if applicable):*

*Protectiveness Statement:*

The implemented actions at the site currently protect human health and the environment because soil excavation activities and institutional controls prevent direct exposure to contaminated soils.

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### **List of Abbreviations**

ADAF	Age Dependent Adjustment Factors
ARAR	Applicable or Relevant and Appropriate Requirement
CEA	Classification Exception Area
DNAPL	Dense Non-Aqueous Phase Liquid
ESD	Explanation of Significant Differences
EPA	Environmental Protection Agency
GWQS	Groundwater Quality Standards
MCL	Maximum Contaminant Levels
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
RA	Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act

## **Executive Summary**

This is the second five-year review for the Federal Creosote Site. The site is located in the Borough of Manville, Somerset County New Jersey. Currently, the implemented remedial actions are functioning as intended and are protective of human health and the environment.

### **I. Introduction**

This is the second five-year review for the Federal Creosote Superfund site (Site), located in the Borough of Manville, Somerset County, New Jersey. This review was conducted by U.S. Environmental Protection Agency (EPA) Remedial Project Manager (RPM), Rich Puvogel. This review was conducted pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §9601 et seq. and 40 CFR 300.430(f)(4)(ii) and in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of five-year reviews is to ensure that implemented remedies protect public health and the environment and that they function as intended by the site decision documents. This report will become part of the Site file.

This Site has been addressed in separate remedial phases or operable units. Operable Unit 1 (OU1) involved permanent relocations of residents and the excavation and off-site treatment and disposal of the material in buried lagoons and canals on residential properties. Operable Unit 2 (OU2) included permanent relocations of residents and the excavation and off-site disposal, with treatment as necessary, of residual creosote soil contamination on residential properties. Operable Unit 3 (OU3) consisted of the excavation of soils containing source material and residual creosote soil contamination from the commercial section of the Site, known as the Rustic Mall as well as site-wide, long-term groundwater monitoring and institutional controls.

In accordance with the Section 1.3.1 of the five-year review guidance, a five-year review is triggered by the initiation of the first remedial action that leaves hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure. Based on the remedial action objectives for OU1, the OU1 remedy did not trigger a statutory five-year review. The trigger for the initial five-year review was the on-site construction start associated with excavation of the OU2 residential



properties, which was February 28, 2002. The initial five year review report was completed on June 7, 2007. This is the second five-year review for the Federal Creosote site. The triggering action for this second review is five years from the June 7, 2007 completion of the initial five-year review report.

## **II. Site Chronology**

Table 1 (attached) summarizes the site-related events from discovery to the present.

## **III. Background**

### *Site Location*

The Site is located in the Borough of Manville, Somerset County, New Jersey and is comprised of a 35-acre residential community and a 15-acre shopping mall.

The Raritan River is located approximately 2,000 feet north and east of the Site and the Millstone River is located approximately 1,200 feet to the southeast. The Site is situated on a topographic high that is nearly equidistant from the Raritan and Millstone Rivers and approximately a mile west (upstream) of their confluence. The Site is bordered to the west by commercial properties that line the east side of Main Street. To the north, on the opposite side of the Norfolk Southern railroad tracks, is the former Johns-Manville company property. The Johns-Manville property has been redeveloped for a variety of commercial and retail uses, including automobile storage, warehousing, and large retail stores. To the south, on the opposite side of the CSX Transportation tracks, is a primarily residential area known as Lost Valley.

### *Physical Characteristics*

The Site is approximately 50 acres in size and consists of 129 single family houses on approximately 35 acres and a 15-acre commercial mall. There are no open streams or drainage ways (other than storm sewers) within the residential and commercial development. Drainage from the commercial mall and residential development is discharged to the Millstone River by a storm sewer system.

### *Site Geology/Hydrogeology*

The deposits underlying the Site were described as silt, which is underlain by a sandy gravel that extends to bedrock. The lithologic descriptions suggested the following sequence (from ground surface

to bedrock) of deposits to be typical at the Site:

- Fill
- Sand and Gravel
- Silt and Clay
- Sand and Gravel (with some silt and clay layers and seams)
- Shales (bedrock)

The fill varies in composition across the Site and predominantly contains a poorly sorted mixture of gravel, sand, silt and clay. The unit also contains lesser amounts of coal/ashes, asphalt, concrete, and brick fragments. The fill unit fluctuates in thickness across the Site from a minimum of approximately two feet to a maximum of approximately five feet, but typically the thickness does not exceed four feet. Topsoil, which is part of this unit, is commonly found to be six to eight inches thick. The fill unit appears to be continuous underneath the Claremont Development.

Underlying the fill unit is a sand and gravel deposit. The typical thickness reported for the unit ranges from three to six feet, and rarely does the thickness exceed seven feet. This sand and gravel unit appears to be continuous within the boundaries of the Claremont Development. Immediately south and southeast of the development in the Lost Valley residential area, this sand and gravel unit is not present, due to a decrease in topographic elevation.

A deposit of silt and clay underlies the sand and gravel unit. Within the boundaries of the Claremont Development, the thickness of the unit fluctuates from a minimum of four inches to a maximum of nine and one half feet. The deposit of silt and clay is believed to be relatively continuous beneath the development.

A second sand and gravel unit lies beneath the fine-grained unit. Additionally, at the base of the unit a discontinuous layer (consisting of grain sizes from clay to cobbles) that is believed to be till has been identified. The thickness of the sand and gravel deposit fluctuates across the Site from approximately 15 feet to 25 feet. The basal till is approximately one foot thick and is likely not continuous.

The bedrock color is typically reddish brown and shows lithologies typical of the Passaic Formation, with alternating red-brown siltstone, sandstone and shale. The rock was described as highly to moderately weathered, friable and soft. The bedrock surface varies in altitude beneath the development from approximately 12 to 17 feet above mean sea level.

The Passaic Formation has been extensively developed for groundwater supplies. Wells capable of yielding tens to hundreds of gallons per minute have been completed throughout much of the formation, generally at depths of 200 to 500 feet. The rocks have little primary permeability. Virtually all groundwater movement occurs through the intersecting fractures. No uses of groundwater from the unconsolidated unit in the immediate vicinity of the Site are known and, with the limited available drawdown, it is unlikely that a usable quantity of water could be obtained from the unit. Fluvial gravel deposits along the Raritan River have been used for water production, including potable water use. The Borough of Manville owns gravel wells near the Raritan River, which were formerly used for potable water.

The Site hydrogeology consists of an unconfined (water table) aquifer with a saturated thickness of 10 to 14 feet in the unconsolidated sediments at depths from about 14 to 21 feet below grade. Locally, isolated perched water zones have been identified at depths of 6 to 10 feet below grade. Beneath the Site, the groundwater surface occurs in the deep sand and gravel unit. It appears likely that groundwater in the uppermost zone of the bedrock is in direct hydraulic connection with the saturated zone in the unconsolidated sediments.

#### *Land and Resource Use*

The Site is divided into two land uses: residential and commercial. The land use in the Claremont Development is strictly residential, consisting of 129 single-family residential houses which are home to approximately 350 residents. According to the Borough of Manville, it is anticipated that the future land use for this development will remain residential. The current land use of the Rustic Mall portion of the Site is commercial. The Borough of Manville and the owners of the Rustic Mall are contemplating revitalization of the mall, which includes a combination of commercial and residential use of the Mall property.

No wetlands are associated with the Site. Groundwater and surface water in the area are both current and potential future sources of drinking water. The groundwater beneath the Site is classified by the New Jersey Department of Environmental Protection (NJDEP) as IIA, potable water, and surface water intakes for the American Water Company facility are within a mile of the Site near the confluence of the Millstone and Raritan Rivers.

### *History of Contamination*

A review of historical information revealed the wood treatment facility treated railroad ties with coal tar creosote. Wood treatment activities at the Site resulted in the production of creosote-contaminated sludges, process residuals, preservative drippings, and spent process liquid. After treatment, railroad ties were moved from the treatment facility to the central portion of the Site known as the "drip area" where the excess creosote dripped from the treated wood onto the ground surface. The most prominent features of the wood treatment operations included two unlined canals that conveyed creosote waste to two unlined lagoons that were used to hold concentrated creosote waste sludge. Creosoting materials and contaminated soils associated with the wood treating facility were not removed prior to construction of the Claremont Development and Rustic Mall. The former lagoons were located from as little as 2 to 5 feet below ground surface within the residential portion of the Site; the waste from one lagoon extended approximately 25 feet below ground surface while the other extended over 35 feet to bedrock. At several properties, the former lagoons and associated sludge were found to abut and/or underlie existing residences. The material in the lagoons was concentrated creosote sludge; on at least one occasion, creosote sludge seeped into a residential basement sump, was pumped onto the residential street, and flowed into the storm sewer system. The creosote waste in the canals was shallower - extending approximately 14 feet below ground surface. The material found in the buried canals ranged from a dry, crusty creosote/soil mixture to flowable creosote waste sludge.

EPA expedited its response to this Site because of the potential risk to residents. In July 1998, EPA initiated a removal action at 11 properties to temporarily cover areas that contained higher surface soil levels of carcinogenic polycyclic aromatic hydrocarbons (PAHs) in exposed surface soils. As an interim action, sod was placed over bare areas in lawns and mulch was placed over exposed soils in garden beds.

### *Basis for Taking Action*

The Site was placed on the National Priorities List on January 19, 1999. EPA performed a Remedial Investigation and Feasibility Study (RI/FS) to determine the nature and extent of contamination at the Site, including a Human Health Risk Assessment. This risk analysis concluded that an unacceptable risk to human health and the environment was present due to PAH exposures, such as benzo(a)pyrene, in the soil of the residential properties and the commercial area

and groundwater, if used as a potable water supply, and that a remedial action to address these risks was warranted.

#### **IV. Remedial Actions**

##### *Remedy Selection*

EPA has addressed the Site in separate operable units. The following remedial action objectives were established for OU1 of the Federal Creosote site:

- clean up the canal and lagoon source areas to levels that will allow for unrestricted land use;
- remove as much source material as possible in order to minimize a potential source of groundwater contamination.

The OU1 Record of Decision (ROD), issued September 1999, called for

- permanent relocation of residents from certain properties within the canal and lagoon source areas, and temporary relocation where necessary to implement the remedy;
- excavation of source material from the canal and lagoon source areas, backfilling with clean fill, and property restoration as necessary; and
- transportation of the source material for off-site thermal treatment and disposal.

The OU2 ROD was issued in September 2000. The following remedial action objectives were established for OU2 of the Federal Creosote site:

- prevent human exposure, via direct contact, with contaminated soils, considering the current and future residential site use;
- prevent future impacts to underlying groundwater quality by contaminated soils;
- prevent exposure and minimize disturbance to the Claremont Development residents, and the surrounding community of Manville, during implementation of the remedial action.

The major components of the OU2 Selected Remedy include:

- excavation of soils containing PAHs in excess of site-specific remediation goals from approximately 82 properties, backfilling with clean fill, and property restoration as necessary, and
- transportation of the contaminated soil off site for disposal, with treatment as necessary.

The OU3 ROD was issued September 30, 2002. The following remedial action objectives were established for OU3 of the Federal Creosote site:

- prevent human exposure via direct contact, inhalation, and ingestion of contaminated soils, considering the future potential residential site use;
- prevent future impacts to underlying groundwater quality by contaminated soils that can act as a continuing source of groundwater contamination; and
- prevent exposure and minimize disturbance to the Rustic Mall occupants and consumers, and the surrounding community of Manville, during implementation of the remedial action.

The OU3 ROD also addressed site groundwater. The following remedial action objectives were established for OU3 groundwater for the Federal Creosote site:

- prevent ingestion and direct contact with groundwater that has contaminant concentrations greater than the Applicable or Relevant and Appropriate Requirements (ARARs);
- minimize the potential for additional off-site migration of groundwater with contaminant concentrations that exceed the ARARs;
- minimize the potential for transfer of groundwater contamination to the other media (e.g., surface water) at concentrations in excess of ARARs.

The major components of the OU3 Soil Remedy include:

- Excavation of soils containing polycyclic aromatic hydrocarbons (PAHs) in excess of site-specific remediation goals on the Rustic Mall, backfilling with clean fill, and property restoration as necessary; and,
- Transportation of the contaminated soil off site for disposal, with treatment as necessary.

As described in more detail in the Decision Summary of the OU2 ROD, the Selected Remedy may leave residual levels of PAHs (but not source material as defined by the September 1999 Record of Decision) at depths greater than approximately 14 feet below the ground surface in the Rustic Mall. The backfilled clean fill would act as a barrier or "engineering control" to prevent contact with any residual contamination. In addition, a deed notice would be required to prevent direct contact with any remaining residual soil contamination.

The major components of the OU3 Groundwater Remedy include:

- Implementation of a long-term groundwater sampling and analysis program to monitor the concentrations of creosote components in the groundwater at the site, to assess the migration and attenuation of the creosote in groundwater over time; and,
- Institutional controls to restrict the installation of wells and the use of groundwater in the vicinity of the contaminated groundwater.

The evaluation of remedial alternatives for remediation of the dense non-aqueous phase liquid creosote contamination, including contamination found in the fractured bedrock aquifer, concluded that no practicable alternatives could be implemented. As a result, EPA invoked an Applicable or Relevant and Appropriate Requirement (ARAR) waiver for the groundwater at this site due to technical impracticability. The area for the TI waiver covers approximately 119 acres. The area includes three distinct subareas: the north off-site subarea, the on-site subarea, and the south off-site subarea (see Figure 1). The TI waiver includes both the overburden aquifer and the bedrock aquifer within the area. The contaminants for which the ARAR apply include: acenaphthene, benzene, naphthalene, 2,4-dimethyl phenol, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, fluorine, chrysene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene.

#### *Remedy Implementation*

##### *Soil and Source-Area Remediation*

EPA has completed remediation of a total of 93 residential properties. The remediation of these properties required permanent and temporary relocation of residents, excavation to depths ranging from 1 to 35 feet below ground surface, and has resulted in the removal of over 260,000 tons of soil from the residential development.

The OU1 ROD estimated that 32 properties contained source material and that residents of 19 of these residential properties needed to be permanently relocated in order to excavate and dispose of the source material. The OU1 remedial action actually included removal of source material from 29 residential properties, required the permanent relocation of 21 OU1 property owners, and the demolition of 18 homes. The residual soil contamination to be addressed by the OU2 remedy was found on all 29 of the OU1 properties in addition to approximately 64 other residential properties and one daycare center.

The cleanup of OU1 was divided into three phases. Phase 1 focused on the cleanup of the southern lagoon; Phase 2 focused on the cleanup of the northern lagoon and canal; Phase 3 focused cleanup efforts on the southern canal.

The OU1 Phase 1 remedial action involved the permanent relocation of the residents from eight properties, demolition of eight single-family homes, and excavation and removal of 55,000 tons of soil to off-site treatment and disposal facilities. Remediation of Phase 1 was completed in June 2002. Ownership of these eight properties was transferred to NJDEP in July 2003. NJDEP sold the eight properties to a residential developer and each property has been redeveloped into single family residential housing.

The OU1 Phase 2 remedial action included the permanent relocation of residents from eight properties located over the northern lagoon and canal. The houses on the eight lots were demolished and excavation of creosote-contaminated soil from this northern lagoon and canal started in April 2002. Excavation on this phase reached a depth of 35 feet below the ground surface. Approximately 116,000 tons of soil were excavated and shipped off site to treatment and disposal facilities. These properties were backfilled with clean soil and were used as a staging area for stockpiling of wastes from other areas of the Site through 2007. The eight residential lots that were remediated during OU1 Phase 2 are located in the Borough of Manville redevelopment zone, and await redevelopment.

The OU1 Phase 3 remedial action included the excavation and off-site disposal of 30,000 tons of contaminated soil from 13 residential properties and roadways located on the buried southern creosote canal. Phase 3 included the permanent relocation of residents from five properties built over a portion of the buried southern creosote canal, and the demolition of two properties. After cleanup, EPA sold two properties that required demolition to a developer. These two properties were redeveloped into single family residences. The remaining three residential properties were also sold and returned to residential use.

The OU2 Phase 1 remedial action consisted of soil removal at 14 residential properties that surrounded the southern lagoon area (OU1 Phase 1). The OU2 Phase 1 remedial action involved no permanent relocations and no demolitions. The remedial action of this phase started in February 2002 and, by June 2002, 8,900 tons of contaminated soil had been excavated, treated and disposed off site, the 14 properties had been completely restored, and temporarily relocated residents returned to their homes.



The OU2 Phase 2 remediation began in June 2003. Cleanup activities have occurred on 50 residential properties and portions of roadways in need of remediation. The OU2 Phase 2 remedial action involved two permanent relocations (for reasons explained on page 11) and no building demolitions. The remediation of a daycare center was included in this phase. In August 2001, the daycare center playground was remediated and in 2006 the daycare center parking lot was remediated. The remedial action of OU2 Phase 2 resulted in the excavation and off-site disposal (with treatment as necessary) of 51,000 tons of soil.

The OU3 remediation addressed soil contamination in the commercial mall. Remediation of OU3 began in August 2005 and was completed in February 2008. The remedial action of OU3 resulted in the excavation and off-site disposal (with treatment as necessary) of 178,000 tons of soil.

Due to an increased volume of soils from those considered for remediation under the OU1, OU2, and OU3 ROD, the resulting costs to address soils were considered a significant change in scope to the source remedies. As such, the change in cost was documented in the 2006 Explanation of Significant Differences (ESD).

#### *Groundwater Monitoring*

Long-term monitoring of Site groundwater started in November 2005, as required by the OU3 ROD. Groundwater monitoring is conducted on an annual basis. Seven rounds of groundwater monitoring have been completed since long-term monitoring of groundwater was initiated.

#### *Institutional Controls for Soils*

The human health risk assessment considered that subsurface soil contamination could pose a direct contact risk to residents over time, through typical residential activities such as gardening or through the removal and surface deposition of subsurface soils during future residential construction activities. At greater depths (deeper than approximately 10 feet), soils are expected to be inaccessible to residential property owners. Deeper excavations (below 10 feet) on OU1 properties were needed to remove source areas, but the OU2 ROD expected that soils with lower concentrations of PAHs (identified as "OU2 soils") could be left in place if the soils were deeper than approximately 10 feet. This was true for OU1 properties (after the source areas were remediated) as well as at a number of OU2 properties.

The OU2 RI/FS identified a number of properties where the extent of creosote contamination was found at the top of the clay layer, which ranged between approximately 8 to 14 feet below the ground surface. The OU2 ROD anticipated remediation depths beyond 10 feet, to as deep as 14 feet (to the top of the clay) to remediate these lots, if excavating to the top of the clay would address all site contamination on the lot. However, the OU2 ROD also identified properties in the Claremont Development where residual soil contamination was found at depths greater than 14 feet below the ground surface. The OU2 ROD concluded that soils at those depths were inaccessible and did not pose an unacceptable health risk through direct contact; however, NJDEP would not concur with an action that left soils in exceedence of the remediation goals at depth, without an additional step of a deed notice for affected properties. While EPA concluded that institutional controls (the deed notices) were not necessary for protectiveness, to facilitate the placement of the deed notices, the OU2 remedy called for the permanent relocation (and purchase) of residential properties if the homeowners did not voluntarily agree to place deed notices on their property. Two OU2 property owners did not agree to place deed notices on their properties. EPA purchased the two OU2 properties, placed deed notices on the properties, and then sold both properties.

During the implementation of the remedy in the residential development, all source material encountered in the Claremont Development was removed and residual contamination above the cleanup goals was left beneath 21 properties. These 21 properties required deed notices.

Of the 21 properties that required deed notices, six properties received deed notices because of conditions that are consistent with the expectations of the OU2 ROD, that is, residual contamination remains below approximately 14 feet on those properties. The remaining 15 properties that required deed notices have contamination shallower than 14 feet. While the ROD did not expect that institutional controls, in the form of deed notices, would be necessary for protectiveness, EPA did in fact rely on these deed notices as part of the remedy, and an Explanation of Significant Differences was issued on August 8, 2008 to explain this variance.

In addition to residential properties, the Borough of Manville applied deed notices to portions of Borough roads that contained residual levels of creosote above remediation goals pursuant to the 2008 ESD.

A deed notice for residual contamination remaining 14 feet below the Rustic Mall property has been implemented by the property owner.

## *Institutional Controls for Groundwater*

The OU3 ROD requires the establishment of a Classification Exception Area (CEA) for the area of groundwater contamination. The CEA was established to provide notice that the constituent standards for a class IIA aquifer classification are not or will not be met in the area of the Federal Creosote Site and that designated aquifer uses are suspended in the affected area for the term of the CEA. Additional monitoring wells were installed to delineate CEA, and the CEA was established in January 2010.

### **V. Progress Since the Last Five-Year Review (FYR)**

The first FYR for the Site was completed in June of 2007. The FYR concluded that the implemented remedies at the Site were protective in the short-term. In order to be protective in the long-term, institutional controls needed to be implemented. In addition, the OU3 soil remedy was being implemented at the time the previous five-year review was conducted.

Since the last five year review, the soil remedy has been completed, institutional controls have been applied to all residential, commercial and Borough-owned properties where needed, the CEA has been established, additional wells have been added to the monitoring well network, and annual groundwater monitoring has been ongoing.

### **VI. Five-Year Review Process**

#### *Administrative Components*

The five-year review team consisted of Rich Puvogel (EPA-RPM), Diana Cutt (EPA-Hydrogeologist), Michael Sivak (EPA-Risk Assessor) and Drew Sites (NJDEP-site manager).

#### *Community Involvement*

EPA published a notice in the Courier News, the area newspaper, on March 2, 2012, notifying the community of the initiation of the five-year review process. The notice indicated that, upon completion of the five-year review, the document would be available to the public at the Manville Public Library. In addition, the notice included the RPM's name, address and telephone number for questions related to the five-year review process or the Federal Creosote Site in general. EPA has received no inquiries from the public in response to this notice.

## Document Review

The documents, data, and information which were reviewed in completing the five-year review are summarized in Table 2 (attached).

## Data Review

Residential and commercial properties have been remediated to levels (Table 3) that would allow for unrestricted use, or, in some cases, residually contaminated soil was left at depth, and institutional controls have been used to prevent direct contact with residual soil contamination. Because there is little potential for direct contact with residual soil contamination, this analysis has focused on groundwater.

Two rounds of groundwater sampling were conducted in 1999, prior to the start of soil remediation. As per the Groundwater Monitoring Plan, a round of groundwater samples was obtained from a monitoring well network of over 30 wells on an annual basis starting in November 2005. Analytical results from latest round of groundwater sampling were compared to the New Jersey Groundwater Quality Standards N.J.A.C. 7:9C (Table 4).

Semi-volatile organic compounds were the most commonly detected organic compounds in the overburden aquifer. The primary indicator compound for groundwater contamination at the Site is naphthalene. During the most recent round of groundwater sampling in 2011, naphthalene was detected in the overburden aquifer in the immediate vicinity of the former southern and northern lagoons and the former wood treatment plant. The naphthalene results, and results for PAHs in general, indicated that shallow groundwater contamination remains in the vicinity of these three areas. At monitoring wells located within the footprint of the lagoons (MW-6S, MW-7S, MW-2RS), naphthalene concentrations stayed near their pre-remediation levels over the period from November 1999 to October 2011 due to the presence of Dense Non-Aqueous Phase Liquid (see Figure 1). Naphthalene concentrations in MW-6S, adjoining Lagoon A area, were 11,000 micrograms per liter (11,000 ug/L) in 1999 and 5,800 ug/L in 2011. Concentrations of naphthalene in Well MW-7S were 3,700 ug/L and 6,600 ug/L in 1999 and 7,200 ug/L in 2011. At wells MW-6S and MW-7S, reported detections of one or more of the PAHs acenaphthene, dibenzofuran, fluorene, phenanthrene, increased between November 1999 and October 2011. Monitoring data from MW-111S indicated an increasing concentration trend of naphthalene in groundwater in the vicinity of the former wood treatment plant, however, at an order of magnitude lower than concentrations detected in the vicinity of the

lagoons. The monitoring data downgradient of the wood treatment plant indicated that the contamination plume remains within the footprint of the 119-acre Technical Impracticability (TI) zone.

Semi-volatile organic compounds were the most commonly detected organic compounds in the intermediate and deep bedrock wells. Naphthalene was detected above its criterion in two on-site wells, MW-5I, in the vicinity of the southern lagoon, and MW-2RI in the vicinity of the northern lagoon. Naphthalene was detected above its criterion in off-site well 116I during the sampling conducted in 2011; however, lower than sampling rounds in 1999. None of the remaining off-site wells had detections of naphthalene. Other PAHs including 2-methylnaphthalene, dibenzofuran, phenanthrene and carbazole were consistently detected in association with naphthalene detections.

Volatile organic compounds, specifically trichloroethene and tetrachloroethene, have also been detected in monitoring wells. The monitoring well data indicate that these contaminants are from a source not associated with the Federal Creosote site.

#### *Site Inspection*

A site inspection was conducted at the site on October 13, 2011 by Rich Puvogel (RPM), Michael Sivak (human health risk assessor) and Diana Cutt (hydrogeologist). The purpose of the inspection was to assess the protectiveness of the remedy.

#### *Interviews*

An interview was conducted between Rich Puvogel and Gary Garwacke, the Business Administrator for the Borough of Manville, on October 20, 2011. No concerns were raised about the protectiveness of the remedy.

#### *Institutional Controls Verification*

Institutional controls required by NJDEP (deed notices on residential properties) are in place. As part of the October 2011 site visit, EPA inspected properties with deed notices and observed no disturbances of the soil in areas identified as having residual soil contamination at depth.

## VII. Technical Assessment

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. Soil contamination at the Site has been addressed by the removal of contaminated soil and off-site treatment and/or disposal. The selected remedy for the groundwater (long-term groundwater monitoring) has been implemented. Groundwater monitoring is conducted on an annual basis. Groundwater data for both the overburden and the bedrock indicate that the groundwater contamination remains localized within the former area of the lagoons and treatment plant. The plume is stable and data evaluation concludes that it is not migrating outside the footprint of the TI zone. Institutional controls have been implemented at all properties.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives (RAOs) used at the time of the remedy still valid?*

Prior to issuing the 1999, 2000, and 2002 RODs, EPA used current risk assessment guidelines to evaluate the exposure assumptions and data relating to the soil and groundwater. This evaluation can be found in the September 29, 2000 and the September 30, 2002 RODs. Briefly, EPA determined that if the subsurface soil contamination were left in place, it would serve as a continuing source of soil and groundwater contamination. Site-related contaminants were detected in the drinking water aquifer at levels above the Federal and New Jersey Maximum Contaminant Levels (MCLs).

The current land use for the residential portion of the Site is not expected to change over the next five years, the period of time considered in this review. Land use for the commercial portion of the Site may change from a strictly commercial use of the property to a mixed residential and commercial use. The remedial action goals established for the Rustic Mall portion of the Site are based on residential use, though there is little difference between appropriate residential and commercial remedial action goals at this Site. The land use considerations and potential exposure pathways considered in the baseline human health risk assessment remain valid.

The Agency released the 2005 Cancer Guidance and Supplemental Guidance that identified benzo(a)pyrene and the other carcinogenic PAHs (based on the relative potency estimate) as having a mutagenic mode of action for carcinogenicity. Based on this determination, the risks from exposure to the benzo(a)pyrene and the other carcinogenic PAHs would

be assessed using Age Dependent Adjustment Factors (ADAFs), where the cancer potency of the PAHs for children aged 0 to 2 years is ten times greater than for adults and the cancer potency for children aged 2 to 16 years is three times greater than for adults. As part of this five year review, the soil remediation goals for all carcinogenic PAHs were re-evaluated with consideration of the increased potency for specific age groups, and the risk levels for the remediation goals are within the acceptable risk range of  $10^{-6}$  to  $10^{-4}$ . Therefore, the remediation goals remain protective.

The evaluation of groundwater in this five-year review focused on two primary exposure pathways, direct ingestion (as a potable water source) and the possibility of vapor intrusion into residential and commercial buildings. The evaluation of the direct contact pathway showed that all nearby residents are receiving public water, and since there are no residential or public supply wells in the contaminated area, there is no exposure. Indoor air sampling was conducted inside residences at the Site in 1997. EPA collected subslab air sampling of residential properties in late February 2007 to further evaluate the direct contact pathway. All subslab results were below EPA's levels of concern. Based on these investigations, the potential for vapor intrusion is not considered to be of concern at this Site.

EPA invoked an ARAR waiver for groundwater in the OU3 ROD due to technical impracticability for the remediation of groundwater at the Site. A review of current technologies for groundwater remediation, the extent of creosote free-phase product in the form of dense non-aqueous phase liquid (DNAPL) in the bedrock, combined with the current land use at the Site continues to indicate that the remediation of groundwater at the Site is technically impracticable. Usage of groundwater at the affected areas is restricted through institutional controls. Long-term groundwater monitoring will be conducted to assess natural attenuation over time.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### *Technical Assessment Summary*

Based upon this five-year review, it has been found that:

- The soil remedial action as detailed in the OU1 ROD (removal of source material from the residential portion of the Site) has been completed. Source material in the residential area of the Site has been removed off site for treatment and/or disposal.

- The required institutional controls needed to address soils remaining above the cleanup goals at the Site have been implemented.
- There are no drinking water wells within the plume of groundwater contamination and none are expected. NJDEP has established a CEA, which will prevent installation of additional wells within the area of groundwater contamination.
- Groundwater monitoring wells are functional.

#### **VIII. Recommendations and Follow-Up Actions**

This report did not identify any issue or recommend any action at the Site needed to protect public health and/or the environment that is not addressed by the remedy selected in Site decision documents.

#### **IX. Protectiveness Statement**

##### *OU1*

The implemented actions at OU1 are protective of human health and the environment. All exposure pathways that could result in unacceptable risks are being controlled.

##### *OU2*

The implemented actions at OU2 are protective of human health and the environment. All exposure pathways that could result in unacceptable risks are being controlled.

##### *OU3*

The implemented actions at OU3 currently protect human health and the environment because a CEA has been implemented to prevent ingestion of contaminated groundwater and soils have been remediated preventing direct exposure to contaminated material. However, in order for the site to be protective in the long-term, the institutional control on the commercial property (OU3) must be implemented.

##### *Sitewide*

The implemented actions at the site currently protect human health and the environment because soil excavation activities and institutional controls prevent direct exposure to contaminated soils.

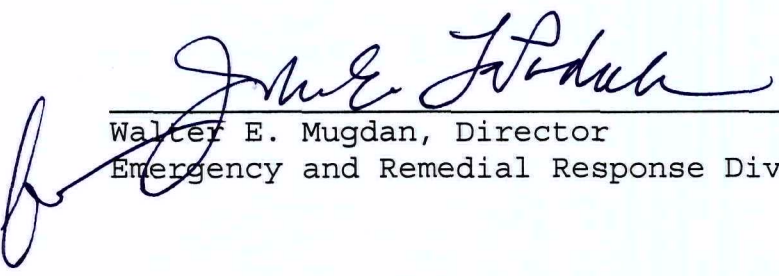


In addition, a CEA is in place to prevent exposure to contaminated groundwater.

**X. Next Review**

Since hazardous substances, pollutants or contaminants remain at the Site, a third five-year review for the Federal Creosote Site should be completed by May 2017, which is five years from this report's approval.

Approved:

  
\_\_\_\_\_  
Walter E. Mugdan, Director  
Emergency and Remedial Response Division

May 3, 2012  
Date

Table 1

<b>Chronology of Events</b>	<b>Date</b>
Operations of the creosoting facility	1911-1955
Construction of the Claremont Development consisting of 137 single family residences begins on 35 acres of the former Federal Creosoting property.	1961
Construction of the Rustic Mall begins on 15 acres of the former Federal Creosoting property.	1963
Manville Health Department responds to a call regarding a basement sump pump discharge of creosote from a Claremont residence onto Valerie Drive.	1997
NJDEP and EPA begin soil investigation in the Claremont Development.	1997
Responsibility for the Site transferred from NJDEP to EPA	1998
Engineering Evaluation and Cost Analysis for Lagoons and Canals	1998-1999
Remedial Investigation/Feasibility Study	1998-2002
Site placed on the National Priorities List	1999
Record of Decision OU 1 addressing residential soils containing source areas	1999
Remedial Design	1999-2004
Record of Decision OU 2 addressing residential areas containing residually contaminated soils	2000
Record of Decision OU 3 addressing contaminated soil in the Rustic Mall and Site wide groundwater contamination	2002
Explanation of Significant Differences related to the increase in estimated costs of the remediation	2006
Explanation of Significant Differences regarding modification of depth requirement for deed notices.	2008
Remedial Action	2000-2008

Table 2

<b>Documents, Data, and Information Reviewed in completing the Five-Year Review</b>	
Focused Engineering/Evaluation Cost Analysis	1999
Engineering Evaluation /Cost Analysis	1999
Operable Unit 1 Record of Decision	1999
Focused Feasibility Study Report	2000
Operable Unit 2 Record of Decision	2000
Remedial Investigation Report for Operable Unit 3, Groundwater, Surface Water and Sediment	2001
Focused Feasibility Study Report Addendum for Operable Unit 3, Rustic Mall Investigation	2001
Feasibility Study Report, Operable Unit 3, Groundwater, Surface Water, and Sediment	2001
Addendum to Feasibility Study Report, Operable Unit 3, Groundwater, Surface Water and Sediment	2002
Operable Unit 3 Record of Decision	2002
Remedial Action Report Operable Unit 1 Phase 1	2005
Remedial Action Report Operable Unit 2 Phase 1	2005
Remedial Action Report Operable Unit 1 Phase 3	2006
Remedial Action Report Operable Unit 2 Phase 2	2006
Remedial Action Report Operable Unit 3	2008
Groundwater Monitoring Report	2012
EPA guidance for conducting five-year reviews and other guidance and regulations to determine if any new Applicable or Relevant and Appropriate Requirements relating to the protectiveness of the remedy have been developed since EPA issued the RODs	

Table 3

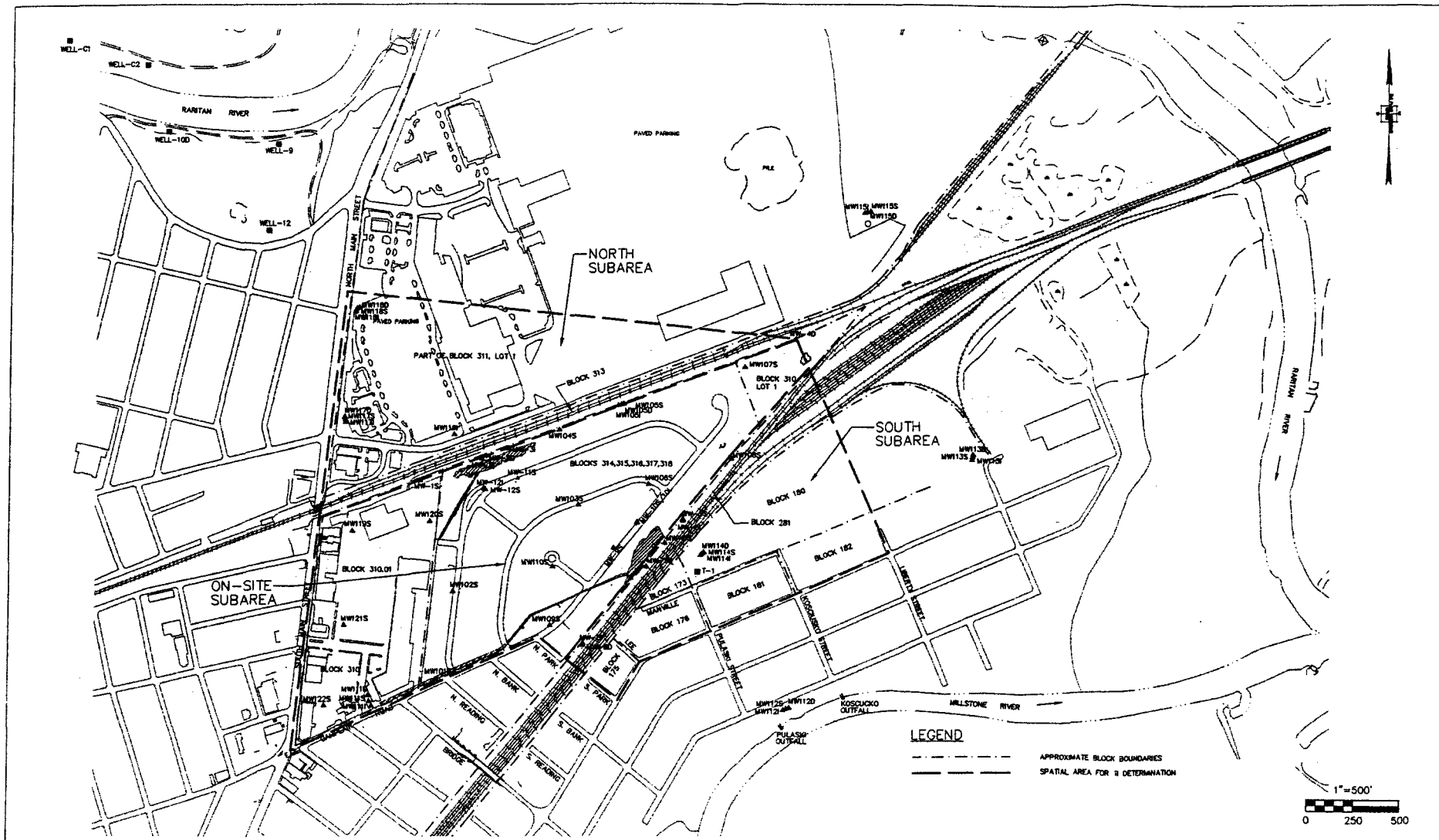
<b>Federal Creosote Site Soil Remediation Goals</b>	
Contaminant of Concern	Remediation Goal (ppm)
Benzo(a)pyrene	0.66
Benzo(a)anthracene	0.90
Chrysene	90.0
Benzo(b)fluoranthene	0.90
Benzo(k)fluoranthene	9.0
Indeno(1,2,3-cd)pyrene	0.90
Dibenz(a,h)anthracene	0.66

Table 4

<b>Groundwater monitoring maximum groundwater concentrations comparison to New Jersey Department of Environmental Protection Groundwater Quality Standards (GWQS) and Federal Maximum Contaminant Levels (MCLs) for 2011 Sampling Event</b>				
<b>Chemical</b>	<b>Maximum Concentration (µg/L)</b>	<b>Location &amp; Date of Maximum Concentration</b>	<b>New Jersey GWQS (µg/L)</b>	<b>Federal MCL (µg/L)</b>
Acenaphthene	80	MW-2RS (10/11)	400	
Acenaphthylene	480	MW-7S (10/11)	100	
Anthracene	51	MW-7S (10/11)	2000	
Benzene	62	MW-2RS (10/11)	0.2	5
Benzo(a)anthracene	140	MW-7S (10/11)	0.05	
Benzo(b)fluoranthene	120	MW-7S (10/11)	0.05	
Benzo(k)fluoranthene	27	MW-7S (10/11)	0.5	
Benzo(g,h,i)perylene	28	MW-7S (10/11)	100	
Benzo(a)pyrene	64	MW-7S (10/11)	0.005	.2
1,1'Biphenyl	160 J	MW-2RS (10/11)	400	
Carbazole	280	MW-2RS (10/11)	5	
Chrysene	76	MW-7S (10/11)	5	
cis-1,2-Dichloroethene	2.2	MW-110I (10/11)	70	70
Dibenzofuran	350	MW-2RS (10/11)	100	
2,4-Dimethylphenol	170	MW-6S (10/11)	100	
Ethylbenzene	220	MW-2RS (10/11)	700	700
Fluoranthene	490	MW-7S (10/11)	300	
Fluorene	320	MW-7S (10/11)	300	
Indeno(1,2,3-cd)pyrene	45 J	MW-7S (10/11)	0.05	
Isopropylbenzene	27	MW-2RS (10/11)	700	
Methylcyclohexane	.37 J	MW-6S (10/11)	100	
2-Methylnaphthalene	450	MW-6S (10/11)	30	
2-Methylphenol	17	MW-6S (10/11)	5	
Naphthalene	11,000	MW-2RS (10/11)	300	
Phenanthrene	640	MW-7S (10/11)	100	
Pyrene	340	MW-7S (10/11)	200	
Styrene	23	MW-2RS (10/11)	100	100
Tetrachloroethene	77	MW-127S (10/11)	0.4	5

Trichloroethene	1.1	MW-111S (10/10)	1	5
Toluene	51	MW-6S (10/10)	600	1000
Xylenes (total)	250	MW-2RS (10/10)	1000	10000

Qualifier: J - the identification of the analyte is acceptable; the reported value is an estimate.



FEDERAL CREOSOTE SUPERFUND SITE  
MANVILLE, NEW JERSEY

FIGURE 1  
SPATIAL AREA FOR TECHNICAL IMPRACTICABILITY DETERMINATION  
JUNE 2002